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FLOOD PLAIN MANAGEMENT

**A Study Of South Fork
Shenandoah Tributaries**

Rockingham County, Virginia

APPENDIX VII

MILL CREEK – CONGERS CREEK

August 1983

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APPENDIX VII
FLOOD PLAIN MANAGEMENT STUDY
SOUTH FORK SHENANDOAH RIVER TRIBUTARIES

TECHNICAL REPORT
MILL CREEK - CONGERS CREEK

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County of Rockingham
In Cooperation With The
Shenandoah Valley Soil and Water Conservation District
and the
State Water Control Board
U.S. Department of Agriculture
Soil Conservation Service

FOREWORD

The main report on the Flood Plain Management Study of South Fork Shenandoah River Tributaries provides information and data needed for use by administrators and the general public. Discussion of findings and recommendations relevant to the total study area are included.

Eight appendixes or technical reports include specifics on each tributary as listed below. Tables, flood profiles and area-flooded photomaps provide information for user agencies and individuals to make technical decisions and to comply with regulations related to the use of flood plains.

Appendix I	Stony Run
Appendix II	Quail Run - Boone Run
Appendix III	Cub Run - Big Run
Appendix IV	Naked Creek
Appendix V	Dry Run
Appendix VI	Hawksbill Creek
Appendix VII	Mill Creek - Congers Creek
Appendix VIII	Pleasant Run

We thank those who contributed their active interest, cooperation, and information to this project.

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 Mill Creek - Congers Creek

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APPENDIX VII

South Fork Shenandoah River Tributaries FLOOD PLAIN MANAGEMENT STUDY Technical Report MILL CREEK - CONGERS CREEK Rockingham County, Virginia

INTRODUCTION

This technical report on Mill Creek and Congers Creek is one of eight such appendixes to the Flood Plain Management Study on South Fork Shenandoah River Tributaries. The main report includes items such as authorities, responsibilities, scope, procedures, description, recommendations, and data common to the tributaries and relevant to the total project.

The first sections of this appendix present general information pertinent to the study on Mill Creek and Congers Creek. Included are brief discussions of natural values, alternate solutions to the flood problems, and suggested items for the flood plain management program. The last section contains data and exhibits needed to make technical decisions for regulation and use of the flood plain.

DESCRIPTION OF STUDY AREA

Upstream Drainage Area

The Mill Creek drainage area comprises 14.4 square miles above its mouth at the South Fork Shenandoah River (see Figure 1). The Shenandoah River is a subbasin of the Potomac River which is in the Mid-Atlantic Region as designated by the Water Resources Council. The USGS Hydrologic Unit code number in the area is 02070005. The watershed is in the Appalachian Ridges and Valleys physiographic province. Soils in most of the drainage area are formed mainly in residuum of limestone, dolomite and calcareous shale in the Shenandoah Valley. Frederick-Lodi-Rock Outcrop is the predominant soil series. Soils in the middle of the watershed are formed in residuum of shale and thin interbedded sandstone and limestone. The predominant soil series is Berks-Sequoia-Weikert. Upland land use is about 8 percent rural residential, farmstead, and other built-up areas. The remainder includes about 4 percent woodland, 30 percent cropland, and 58 percent pasture, meadow and idle brushland.

Flood Plain

The study area includes the flood plain along 4.2 miles of Mill Creek; 3.6 miles of Congers Creek and 0.4 miles of Duck Run. It extends from the junction at South Fork Shenandoah River up to Lake Shenandoah.

Land use in the flood plain is about 99 percent pasture and hay and 1 percent miscellaneous. About 5 bridges and 2 farm buildings would be subject to varying amounts of damage during extreme floods.

Natural and Beneficial Flood Plain Values

The stream corridor through the flood plain has limited potential for nongame fish and wildlife habitat. Streambank stabilization and protection and establishment of vegetative cover are the primary needs to improve this potential.

FLOOD HISTORY

Flooding on Mill Creek and Congers Creek usually results from intense thunderstorm activity. Excess rainfall concentrates quickly on the steep slopes; flood stages rise rapidly and fall just as quickly. Limited flooding and damage may occur several times each year to rural roads and farm improvements. No records or recollections were noted on unusually severe floods on Mill Creek and Congers Creek. Average annual flood damages were estimated to be insignificant.

FLOOD POTENTIAL

Present Conditions

Extreme floods would inundate about 237 acres of primarily agricultural land (see Table below). Some damage would be done to the land, crops, fences, farm roads, buildings and machinery. Velocities would average about three feet per second and exceed five feet per second in some reaches. Out-of-bank stages would range from about two to seven feet. Duration of flooding would seldom exceed six hours except during storms of intense and prolonged rainfall. Figure 1 and Figure 2 show potential flood stages.

The acres tabulated below primarily apply to pasture and meadow, but varying amounts of damage would occur to 2 farm buildings and 5 bridges.

<u>Type of Damage</u>	<u>Acres Inundated</u>	
	<u>100-year flood</u>	<u>500-year flood</u>
Mill Creek		
Agricultural	130	136
Miscellaneous	<u>1</u>	<u>1</u>
TOTAL	131	137
Congers Creek		
Agricultural	88	93
Miscellaneous	<u>1</u>	<u>1</u>
TOTAL	89	94



Fig 1. Potential flood stages at cross-section 23A upstream of State Route 671 over Mill Creek.



Fig 2. Potential flood stages at cross-section 21, State Route 659 over Mill Creek.



Fig. 3 Potential flood stages at cross-section 54,
State Route 276 over Congers Creek.

Duck Run		
Agriculture	17	18
Miscellaneous	0	0
TOTAL	<u>17</u>	<u>18</u>
GRAND TOTAL	237	249

Limitations on Use of Data. The flood elevations given in this report should be considered as minimum elevations. During floods, uprooted trees and other debris may collect on bridges and culverts and clog the channels. Such obstructions increase the depth and extent of flooding. Analyses were made without showing the effects of potential obstructions. Also, extremely rare events such as dam failure and climatic changes were not analyzed.

Future Conditions

The hydrologic conditions in the upstream areas are expected to improve as farmers and foresters continue to apply good management and conservation practices. This improvement is expected to reduce runoff approximately to the extent that additional development will increase runoff. Therefore, the flood hazard and damage potential is not expected to change significantly in the next 10 to 15 years.

FLOOD PLAIN MANAGEMENT

The main report includes a discussion of existing programs, current regulations, availability of flood insurance, recommendations, and related items relevant to the total study. The items discussed below relate only to Mill Creek and Congers Creek .

Floodway. The data for a "first trial" or computed floodway is filed with the basic data for Mill Creek and Congers Creek. The results indicate that hazardous conditions of depth and/or velocity prevail at current 100-year flood levels in most reaches, and that generally little encroachment should be allowed in the flood plain. The data can be used as a basis for further study of local measures, but it is suggested that no continuous or extensive floodway be considered.

Recommendations

In preparation of their comprehensive flood management program, the local sponsors should implement the following recommendations on Mill Creek and Congers Creek.

- Monitor future developments in the watershed to assure that regulations are followed so as not to increase the flood hazard;
- Assist landowners in studies of local protection measures to reduce streambank erosion and the spread of floodwaters; and

-- Encourage the re-establishment of natural vegetation in the flood plain to restore the fish and wildlife habitat.

Evaluation of Potential

The potential for reducing the flood hazard on Mill Creek and Congers Creek is limited by the relatively low value of average annual flood damages.

Hydrologic conditions under current land use and management practices are generally good to excellent. An improved conservation use-and-land treatment only program would provide only limited reductions in runoff and flood stages.

These observations apply generally to all the study tributaries as do the recommendations listed in the main report. The primary opportunities have to do with prohibition of future construction or other encroachment in the flood plains; and with other regulations needed to avoid increased runoff and to minimize flood damages.

TECHNICAL DATA AND EXHIBITS

This section provides the data and exhibits needed by user agencies and individuals to make technical decisions and to comply with regulations on use of the flood plain on Mill Creek and Congers Creek.

The index map shows the area covered by the individual photomaps. Flood hazard photomaps show the area inundated by the 100 and 500-year floods. Where only one line is shown, there is no significant difference in the boundaries of the two flood areas. These photomaps should only be used to determine approximate flood elevations; they are based on semicontrolled mosaics and the boundaries shown may vary from the location on the ground.

Flood profile plates provide elevations of the 10, 50, 100 and 500-year floods at any location along the length of the streams. The elevations and discharges of the 10, 25, 50, 100 and 500-year flood at each surveyed cross section are given in Table MC-1. Sample cross sections illustrated how the flood area boundaries were located. Table MC-2 provides the description and elevation of benchmarks which are located on the photomaps.

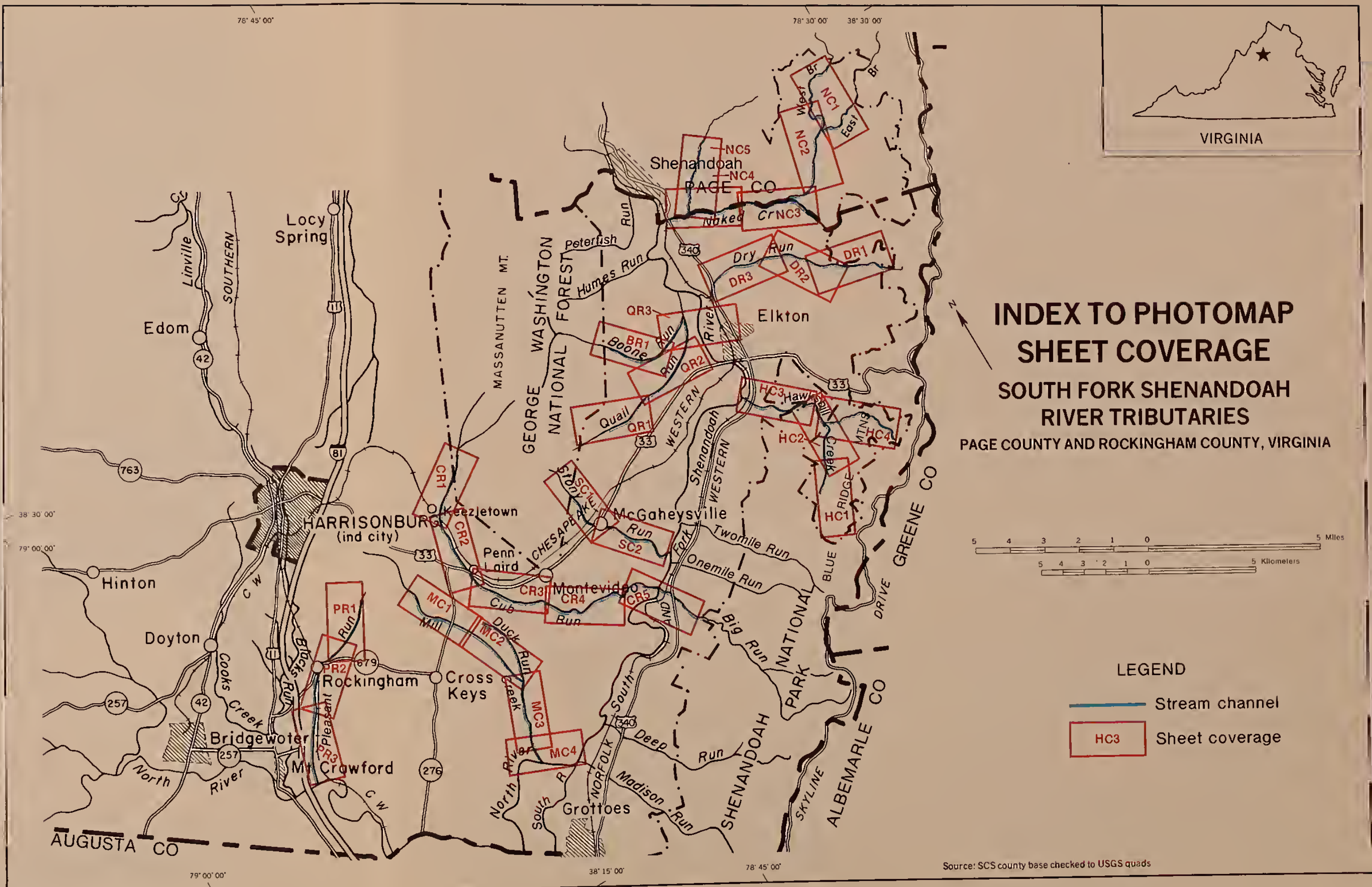
Table MC-1 can be used to locate flood elevations on the ground at surveyed cross sections.

The photomaps, flood profiles and bench mark data can be used to locate flood elevations between surveyed cross sections, as follows:

1. On the appropriate photomap find the point on the stream where the flood line is to be located; then scale the distance along the stream to the nearest cross section.

2. On the appropriate flood profile sheet, scale the distance determined in Step 1 from the cross section back to the original stream location, and read the elevation of the desired flood frequency line.
3. Transfer the elevation determined in Step 2 to the ground from the nearest established benchmark.

A glossary, bibliography and discussion of technical procedures are included in the main report for this study. The basic data is on file in the office of the USDA Soil Conservation Service, Richmond, Virginia 23240.





SOURCE: Semi-controlled mosaic prepared from
USDA-ASCS Aerial photography flown 1974

USDA-ASCS Aerial photography flown 1974



SOURCE: Semi-controlled mosaic prepared from
USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983



SOURCE: Semi-controlled mosaic prepared from
USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983

LEGEND

- Stream channel
- 500 year flood area
- 100 year flood area
- Stream miles
- 22B Surveved cross sections
- X BM-12 Bench mark

NOTE: When only one line and color is shown
the 100 and 500 year flood areas
are the same.



SOURCE: Semi-controlled mosaic prepared from
USDA ASCS Aerial photography flown 1974

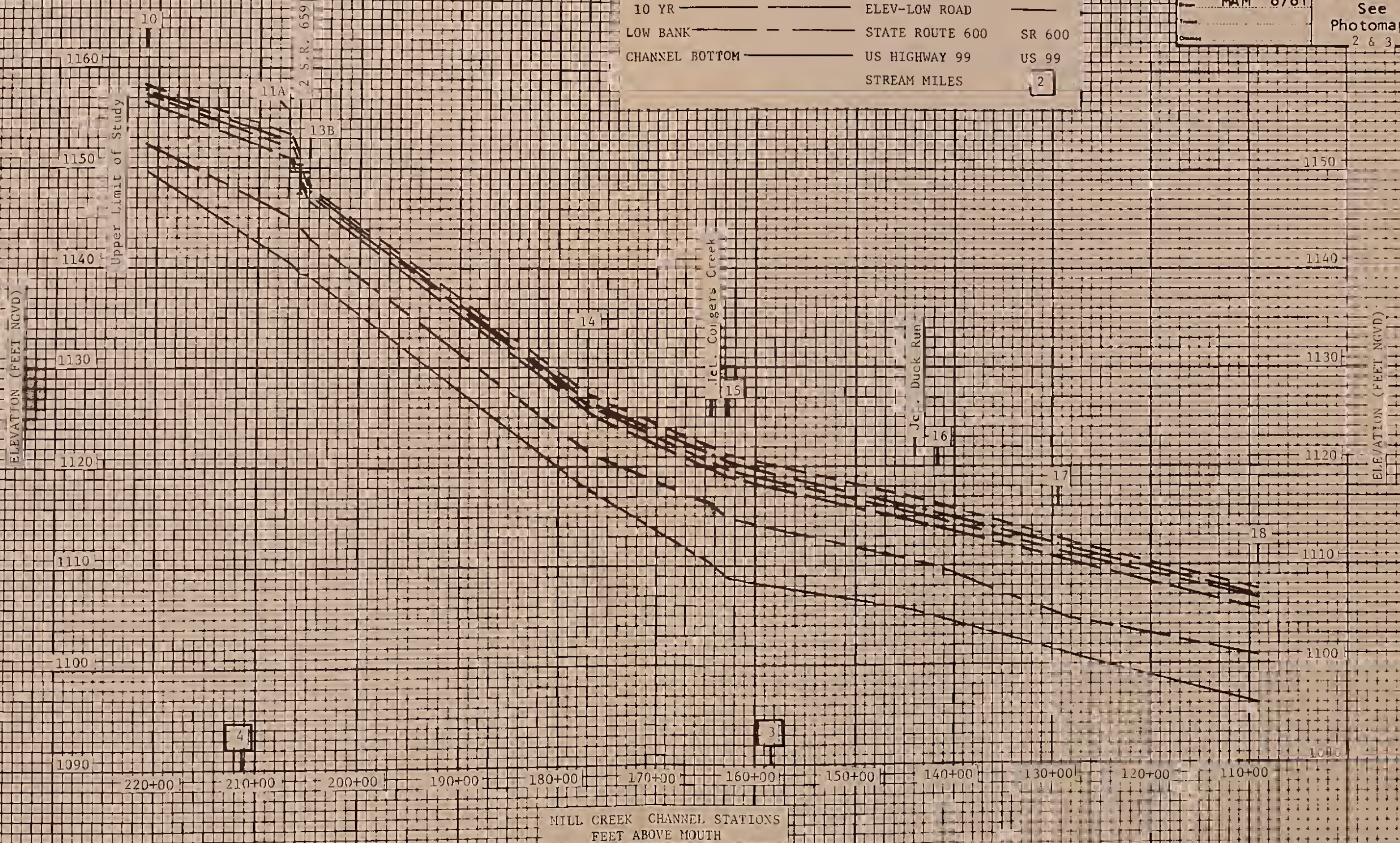
USDA SCS-FORT WORTH, TEXAS 1983

LEGEND

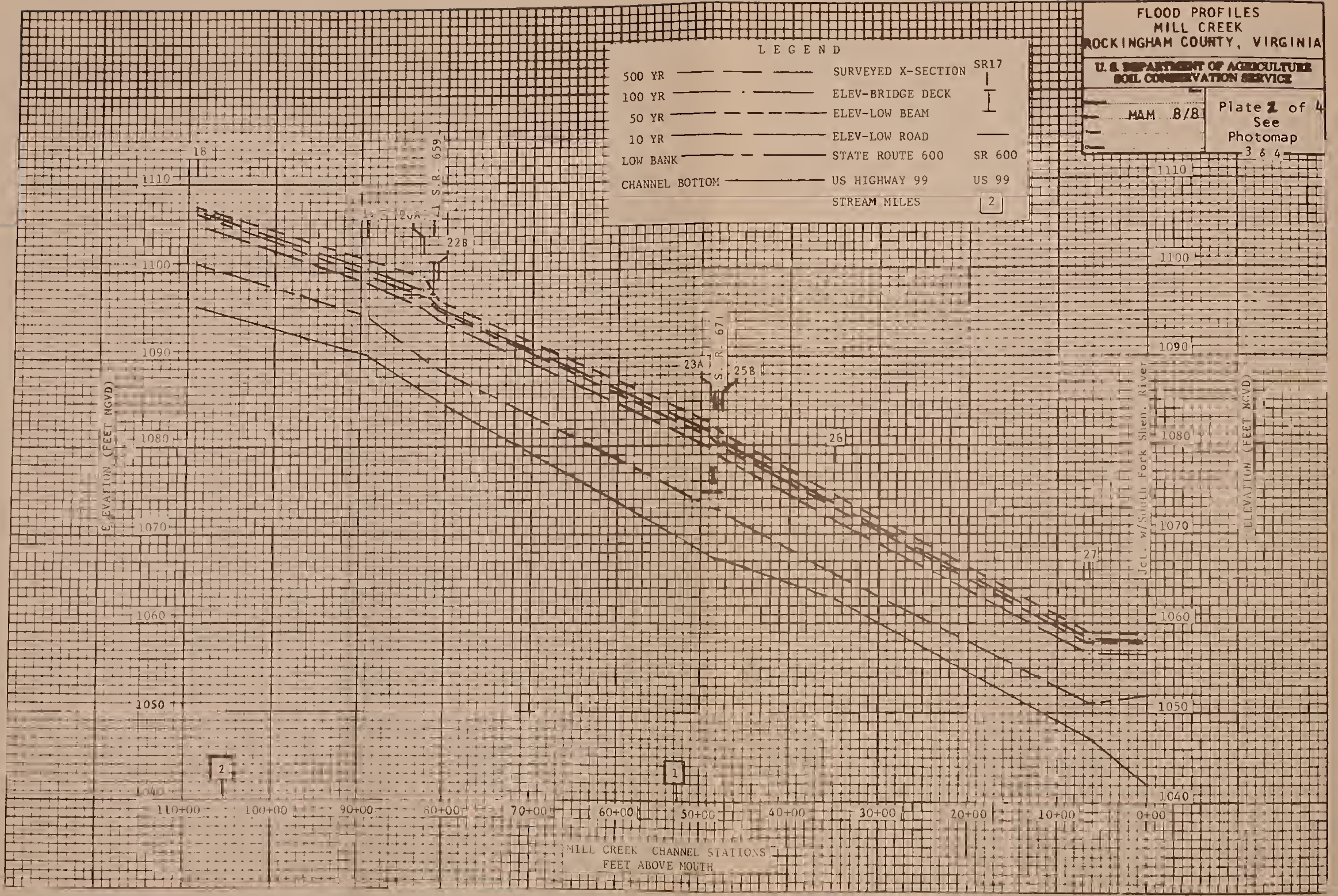
- Stream channel
- 500 year flood area
- 100 year flood area
- Surveyed cross sections
- Bench mark

NOTE: When only one line and color is shown
the 100 and 500 year flood areas
are the same.

LEGEND			
500 YR	— — — — —	SURVEYED X-SECTION	SR25
100 YR	- - - - -	ELEV-BRIDGE DECK	I
50 YR	- - - - -	ELEV-LOW BEAM	I
10 YR	- - - - -	ELEV-LOW ROAD	—
LOW BANK	- - - - -	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	— — — — —	US HIGHWAY 99	US 99
		STREAM MILES	2



LEGEND		
500 YR	-----	SURVEYED X-SECTION SR17
100 YR	-----	ELEV-BRIDGE DECK
50 YR	-----	ELEV-LOW BEAM
10 YR	-----	ELEV-LOW ROAD
LOW BANK	-----	STATE ROUTE 600 SR 600
CHANNEL BOTTOM	-----	US HIGHWAY 99 US 99
		STREAM MILES 2

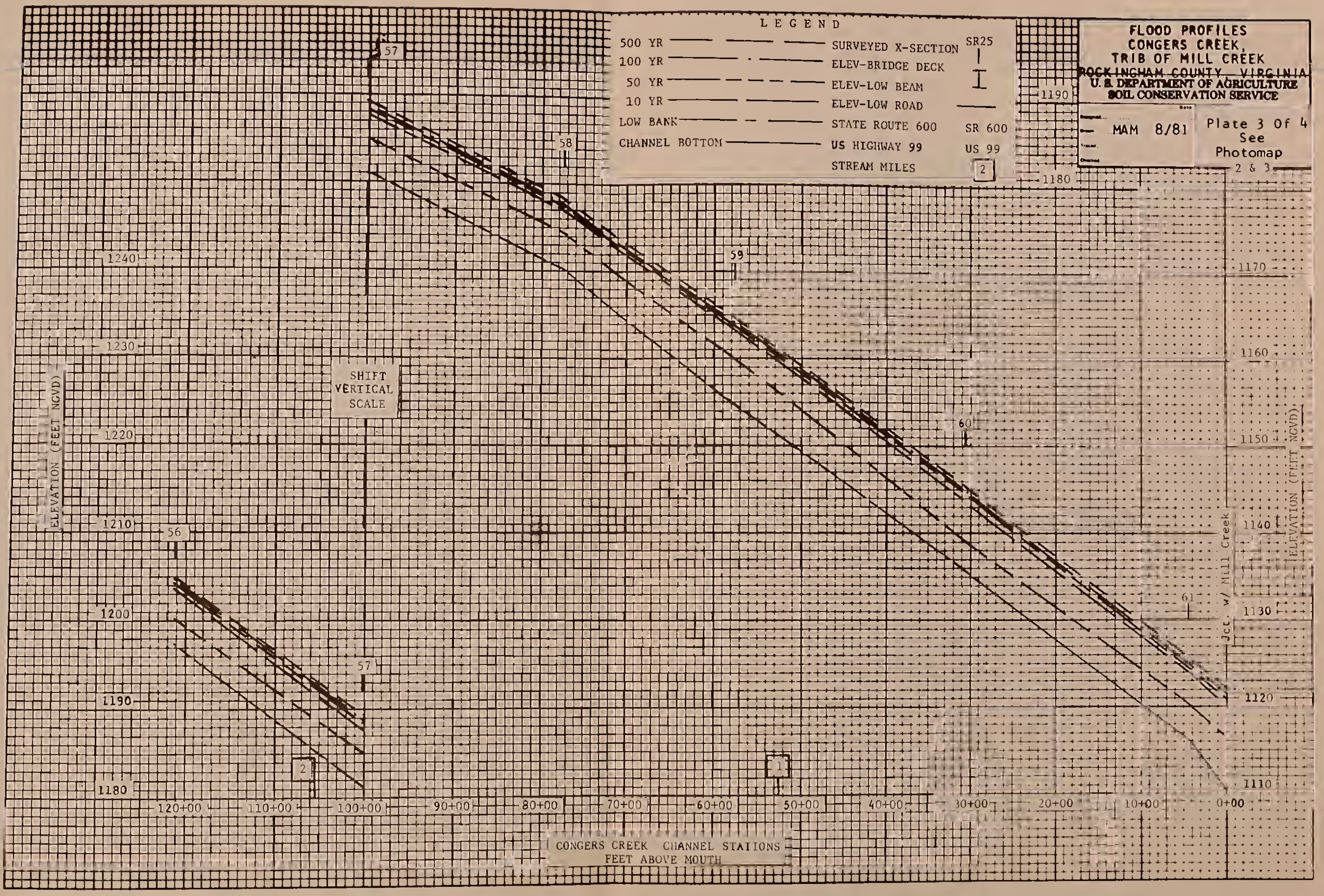


LEGEND

500 YR	—————	SURVEYED X-SECTION	SR25
100 YR	—————	ELEV-BRIDGE DECK	I
50 YR	—————	ELEV-LOW BEAM	I
10 YR	—————	ELEV-LOW ROAD	—————
LOW BANK	—————	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	—————	US HIGHWAY 99	US 99
		STREAM MILES	2

FLOOD PROFILES
CONGERS CREEK,
TRIB OF MILL CREEK
ROCKINGHAM COUNTY, VIRGINIA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MAM 8/81 Plate 3 of 4
 See
 Photomap
 2 & 3



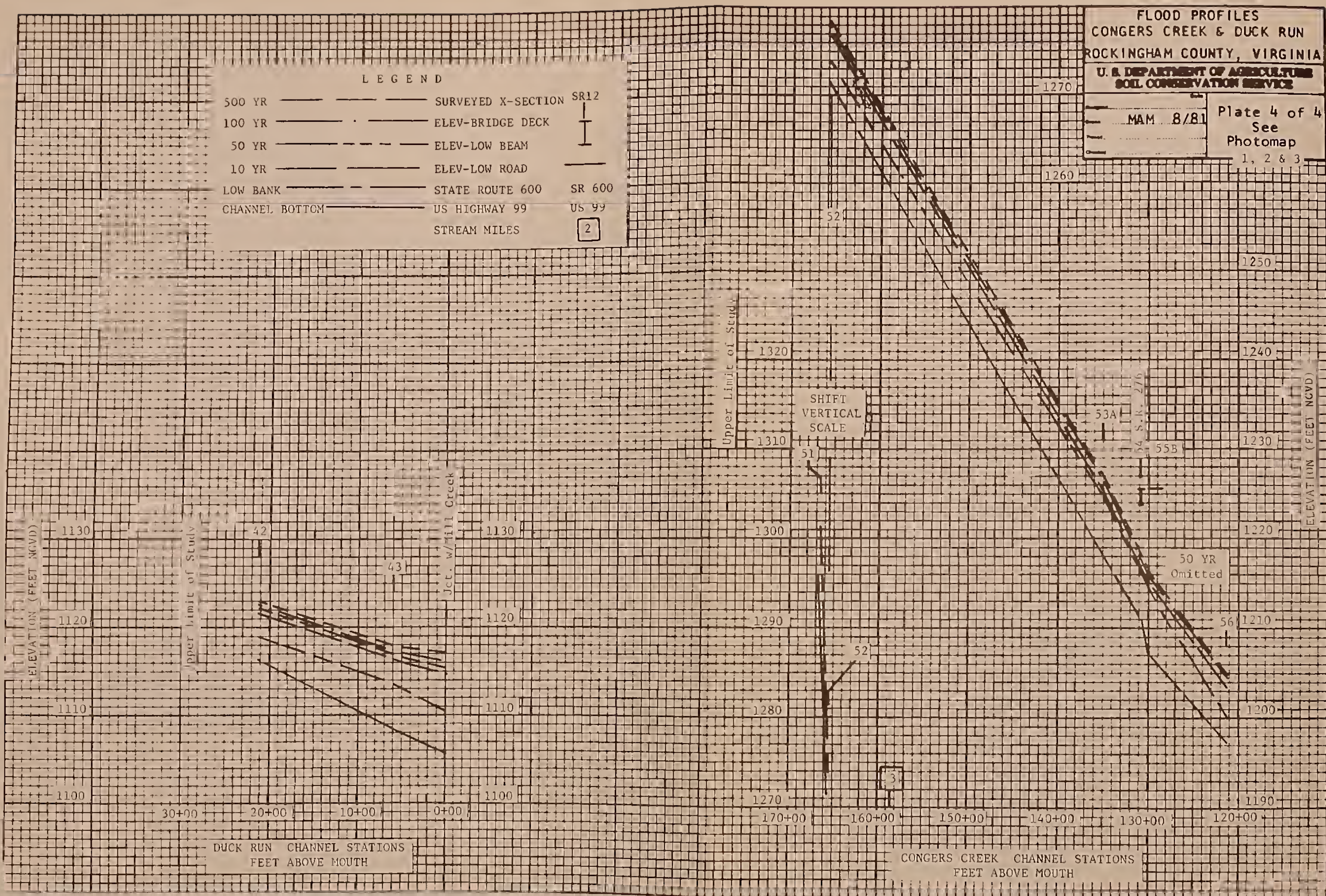
FLOOD PROFILES
CONGERS CREEK & DUCK RUN
ROCKINGHAM COUNTY, VIRGINIA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MAM 8/81

Plate 4 of 4
See
Photomap
1, 2 & 3

LEGEND

500 YR	-----	SURVEYED X-SECTION	SR12
100 YR	-----	ELEV-BRIDGE DECK	
50 YR	-----	ELEV-LOW BEAM	
10 YR	-----	ELEV-LOW ROAD	
LOW BANK	-----	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	2



TYPICAL CROSS SECTIONS
MILL CREEK
ROCKINGHAM COUNTY, VIRGINIA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed by
Drawn by MAM 8/8
Typed by
Checked by

1110

500YR 1107.7

100YR 1107.0

50YR 1106.6

10YR 1105.7

1105

1100

CROSS SECTION - 18

3+00

2+00

1+00

0+00

1+00

2+00

1095

500YR 1082.7

100YR 1081.6

50YR 1081.0

10YR 1079.9

1080

S.R.
671

1075

1070

CROSS SECTION - 23A

1+00

0+00

1+00

2+00

3+00

4+00

1065

ELEVATION (NGVD)

Table MC-1 Frequency-discharge-elevations, Mill Creek; South Fork Shenandoah River Tributaries, Rockingham County, Virginia

X-Sec.	Photomap No.	Profile Plate No.	DA (sq mi)	10-year			25-year			50-year			100-year			500-year		
				Disch. (cfs)	Elev. (ngvd)		Disch. (cfs)	Elev. (ngvd)		Disch. (cfs)	Elev. (ngvd)		Disch. (cfs)	Elev. (ngvd)		Disch. (cfs)	Elev. (ngvd)	
Top W/S			0															
10	2	1	2.29	1740	1156.6	2090	1157.2	2350	1157.5	2660	1157.7	3390	1158.4					
11A	2	1	2.35	1800	1151.0	2130	1151.6	2400	1152.0	2750	1152.5	3460	1153.2					
HWY 659																		
12			State Route 659; Low Road 1149.8; Low Beam 1147.4; Bridge Deck 1150.2															
13B	2	1	2.36	1810	1146.9	2140	1147.1	2410	1147.4	2760	1147.6	3470	1148.1					
14	3	1	3.44	2360	1125.5	2820	1125.9	3160	1126.2	3580	1126.5	4600	1127.4					
CONGER CRK																		
JCT			8.99															
15	3	1	8.99	3520	1119.0	4290	1119.5	4850	1119.8	5530	1120.3	7200	1121.2					
DUCK RUN																		
JCT			10.90															
16	3	1	11.01	4320	1114.0	5240	1114.5	5920	1114.9	6750	1115.3	8740	1116.2					
17	3	1	11.26	4470	1110.9	5390	1111.4	6000	1111.7	6800	1112.1	8800	1112.9					
18	3	1&2	11.48	4620	1105.7	5540	1106.3	6200	1106.6	6900	1107.0	9000	1107.7					
19	3	2	12.04	4790	1098.9	5700	1099.4	6480	1099.7	7300	1100.3	9500	1101.3					
20A	3	2	12.10	4800	1095.9	5840	1096.6	6600	1097.1	7500	1097.9	9700	1099.4					
HWY 659																		
21			12.12	State Route 659; Low Road 1101.10; Low Beam 1097.40; Bridge Deck 1101.1														
22B	3	2	12.12	4820	1094.6	5850	1095.1	6610	1095.4	7540	1095.8	9780	1096.9					
23A	3	2	13.85	5340	1079.9	6440	1080.5	7390	1081.0	8390	1081.6	10800	1082.7					
HWY 671																		
24			13.86	State Route 671; Low Road 1074.7; Low Beam 1075.5; Bridge Deck 1077.5														
25B	3	2	13.88	5350	1078.6	6450	1079.3	7400	1079.7	8400	1080.3	10900	1081.4					
26	4	2	13.95	5200	1071.8	6600	1072.6	7500	1073.0	8500	1073.6	11000	1074.6					
27	4	2	14.39	5630	1056.7	6870	1057.4	7790	1057.7	8900	1058.1	11600	1059.0					
SOUTH FK.																		
SHEN.	4	2	14.42	5630	1056.7	6870	1057.4	7790	1057.7	8900	1058.1	11600	1059.0					

Table MC-1 Frequency-discharge-elevations, Congers Creek - Mill Creek; South Fork Shenandoah River Tributaries, Rockingham County, Virginia

X-Sec.	Photomap No.	Profile Plate No.	DA (sq mi)	10-year		25-year		50-year		100-year		500-year	
				Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)
Top W/S			0										
DAM 51	1	4	4.24	1660	1299.4	2000	1299.7	2260	1300.0	2560	1300.3	3280	1301.0
52	1	4	4.24	1670	1277.2	2020	1277.5	2270	1277.7	2570	1278.0	3310	1278.6
53A	1	4	4.34	1680	1225.7	2030	1226.2	2280	1226.4	2590	1226.7	3340	1227.4
HWY 276													
54			4.37	State Route 276; Low Road 1225.4; Low Beam 1223.8; Bridge Deck 1225.5									
55B	1	4	4.37	1690	1214.7	2040	1215.4	2290	1215.6	2600	1215.9	3340	1216.3
56	2	483	4.64	1700	1203.6	2050	1204.0	2300	1204.2	2610	1204.5	3350	1204.8
57	2	3	4.80	1710	1187.7	2070	1188.1	2320	1188.3	2630	1188.5	3380	1189.2
58	2	3	4.97	1720	1177.0	2090	1177.4	2340	1177.6	2650	1177.8	3410	1178.5
59	2	3	5.10	1730	1163.3	2100	1163.6	2360	1163.7	2670	1164.1	3440	1164.7
60	2	3	5.30	1760	1143.7	2120	1144.1	2380	1144.4	2700	1144.6	3480	1145.4
61	3	3	5.46	1770	1123.9	2140	1124.3	2400	1124.5	2720	1124.8	3490	1125.5
MILL CRK													
JCT			5.47										
Duck Run - Tributaries of Mill Creek													
Top W/S													
42	3	4	1.52	880	1121.6	1050	1121.9	1180	1122.2	1340	1122.5	1720	1123.0
43	3	4	1.59	880	1116.2	1050	1116.6	1180	1116.8	1340	1117.3	1720	1117.9
MILL CRK													
JCT													

Table MC-2 Reference mark Descriptions and Elevations, Mill Creek Rockingham County, VA-1981

R.M. No.	Photo Sheet No.	Description, Location and Elevation
23	1	SCS TBM - A square is chiseled on the downstream south-west abutment of bridge over Congers Creek on State Route 276. Elevation 1225.89
21	2	SCS TBM - A SCS disk in base of west flood gate Post at line fence between Diehl, Stickley and Miller. Elevation 1183.87
29	2	SCS TBM - A square is chiseled on the northeast downstream corner of culvert headwall No. 6309 over Mill Creek, on State Route 659. Elevation 1149. 32
17	3	SCS TBM - A square is chiseled on the downstream south corner of low water concrete slab over Congers Creek on State Route 708 at Goods Mill. Elevation 1116.88
12	3	SCS TBM - A square is chiseled on the north upstream corner of bridge on State Route 659 over Mill Creek. Elevation 1101.06
306	4	SCS TBM - A disk in base of a 30" maple tree approximately 200 south west of dwelling on Logan Property and 25' east of the river bank and 350' upstream from the Mill Creek junction with the South Fork Shenandoah River. Elevation 1054.83

Note: Elevation in feet above National Geodetic Vertical Datum of 1929



R0000 556996



R0000 556996